

Algebra 1 · Adding, Subtracting and Multiplying Polynomials · Worksheet Answer Key

Common Core A-APR.A.1, A-SSE.A.2 · mathovore.fr

Every solution below shows the steps: the combined like terms, the four FOIL products and the checks. Compare each step with your own work, not only the final answer in bold.

Algebra 1 Common Core: A-APR.A.1 · A-SSE.A.2

Problem 1: Degree and terms

The largest exponent is 3, so the degree is **3**. The term $4x^3$ has the largest exponent, so the leading coefficient is **4**. There are **3 terms**, so it is a **trinomial**.

Problem 2: Standard form

Order the terms from the highest power to the lowest, keeping each sign with its term: x^3 , $-2x^2$, $6x$, 5 .

$$x^3 - 2x^2 + 6x + 5$$

Problem 3: Classify polynomials

- a. One term, degree 2: **a monomial of degree 2**.
- b. Two terms, degree 2: **a binomial of degree 2**.
- c. Three terms, degree 3: **a trinomial of degree 3**.

Problem 4: Add polynomials

Combine like terms column by column: $3x^2 + 2x^2 = 5x^2$, $5x - 8x = -3x$, $-4 + 9 = 5$.

$$5x^2 - 3x + 5$$

	x^2 terms	x terms	constants
first	3	5	-4
second	2	-8	9
sum	5	-3	5

The completed table gives $5x^2 - 3x + 5$.

Problem 5: Subtract polynomials

Distribute the negative sign: $7x^2 - 3x + 1 - 4x^2 - 2x + 6$.

Combine like terms: $(7-4)x^2 + (-3-2)x + (1+6)$.

$$3x^2 - 5x + 7$$

Problem 6: Two variables

Match like terms: $x^2 + 5x^2 = 6x^2$, $4xy - 2xy = 2xy$, $-3y^2 + y^2 = -2y^2$.

$$6x^2 + 2xy - 2y^2$$

Problem 7: Subtract with a missing term

Distribute the negative: $6a^3 - 2a + 5 - a^3 - 4a^2 + 2a + 3$.

The a terms cancel: $-2a + 2a = 0$. The constants give $5 + 3 = 8$.

$$5a^3 - 4a^2 + 8$$

Problem 8: Multiply monomials

Multiply the coefficients: $3 \cdot (-4) = -12$. Add the exponents: $x^2 \cdot x^5 = x^7$.

$$-12x^7$$

Problem 9: Distribute a monomial

$5x \cdot 2x^2 = 10x^3$, $5x \cdot (-3x) = -15x^2$, $5x \cdot 4 = 20x$.

$$10x^3 - 15x^2 + 20x$$

Problem 10: Box method

The cells are $x \cdot x = x^2$, $4x$, $3x$ and 12. Combine $4x + 3x = 7x$.

$$x^2+7x+12$$

	x	+4
x	x^2	$4x$
+3	$3x$	12

The four cells add to $x^2+7x+12$.

Problem 11: FOIL with a negative

First: $2x^2$. Outer: $12x$. Inner: $-5x$. Last: -30 .

Add: $2x^2+12x-5x-30$, so $12x-5x=7x$.

$$2x^2+7x-30$$

Problem 12: FOIL, both negative

First: $12x^2$. Outer: $-21x$. Inner: $-8x$. Last: 14.

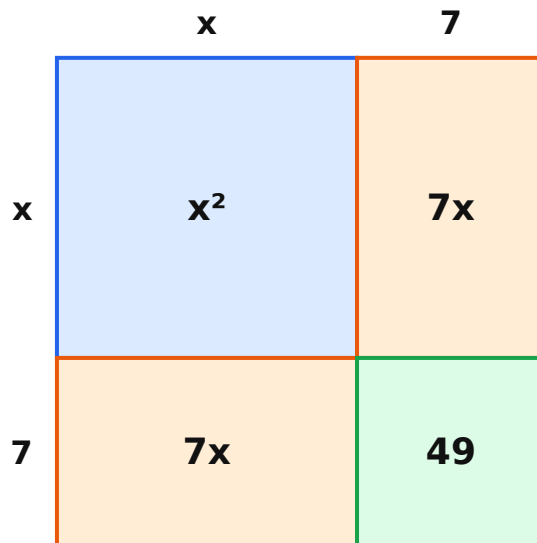
Combine $-21x-8x=-29x$.

$$12x^2-29x+14$$

Problem 13: Square of a binomial

Use $(a+b)^2=a^2+2ab+b^2$ with $a=x$ and $b=7$: $x^2+2(x)(7)+7^2$.

$$x^2+14x+49$$



The four parts add to $x^2+14x+49$.

Problem 14: Square of a difference

Use $(a-b)^2 = a^2 - 2ab + b^2$ with $a = 3x$ and $b = 5$: $(3x)^2 - 2(3x)(5) + 5^2$.

$$9x^2 - 30x + 25$$

Problem 15: Difference of squares

The middle terms cancel, so $(a+b)(a-b) = a^2 - b^2$ with $a = 2x$ and $b = 9$.

$$4x^2 - 81$$

Problem 16: Binomial times trinomial

Distribute x : $x^3 + 2x^2 - 5x$. Distribute -3 : $-3x^2 - 6x + 15$.

Combine like terms: $2x^2 - 3x^2 = -x^2$ and $-5x - 6x = -11x$.

$$x^3 - x^2 - 11x + 15$$

Problem 17: Closure

The x^2 terms cancel: $4x^2 - 4x^2 = 0$. The sum is $3x + 5$, with degree 1.

$3x + 5$ is still a polynomial, which agrees with closure under addition. Note that the sum can have a lower degree than either addend.

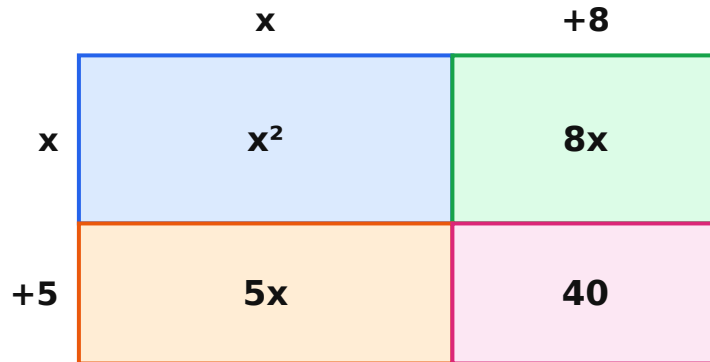
Problem 18: Garden area

Area = length times width: $(x+8)(x+5) = x^2 + 5x + 8x + 40$, so the area is $x^2 + 13x + 40$ **square**

feet.

For $x = 4$: $16 + 52 + 40 = 108$. Check with the dimensions: $12 \times 9 = 108$.

108 square feet



The garden's area model.

Problem 19: Profit polynomial

$P = (-x^2 + 50x) - (10x + 120) = -x^2 + 50x - 10x - 120$, so $-x^2 + 40x - 120$.

For $x = 10$: $-100 + 400 - 120 = 180$. Check: revenue \$400 minus cost \$220 is \$180.

\$180

Problem 20: Picture frame

Border = outer square minus photo: $(x+8)^2 - (x+2)^2$.

$(x^2 + 16x + 64) - (x^2 + 4x + 4) = 12x + 60$.

For $x = 4$: $12(4) + 60 = 108$. Check: $12^2 - 6^2 = 144 - 36 = 108$.

$12x + 60$; **108 square inches**

Problem 21: Mental math

Write $52 = 50 + 2$ and $48 = 50 - 2$. Then $(50+2)(50-2) = 50^2 - 2^2$ by the difference of squares pattern.

$2500 - 4 = 2496$.

2,496

Problem 22: Metal sheet with a cutout

Remaining area = sheet minus square: $(3x+4)(x+2)-x^2$.

$$(3x^2+6x+4x+8)-x^2=2x^2+10x+8.$$

For $x=3$: $18+30+8=56$. Check: $13 \times 5 - 3^2 = 65 - 9 = 56$.

$2x^2+10x+8$; **56 square inches**

Problem 23: Find the error

At $x=1$: the left side is $(1+5)^2=36$ but Noah's right side is $1+25=26$. They differ, so he is wrong.

He squared each term separately. Squaring means multiplying the binomial by itself, so the middle term $2 \cdot x \cdot 5 = 10x$ is missing.

$$x^2+10x+25$$